REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the present amendments and following discussion, is respectfully requested.

The non-elected Claims 11-14 have been cancelled without prejudice to the filing of a divisional application directed thereto.

Claim 1 has been amended to further recite using the flow rate-controlling partitions to prevent oxidizing gas from flowing from the discharging step to the cooling step. Basis for this is found at page 10, lines 15-17. It is noted that this portion of the specification has been amended to correct an obvious error (the discharging step is exposed to the atmosphere and has oxidizing gas – not reducing gas – that can prevent a high degree of reduction).

Claim 2 has been amended to further recite using the flow rate-controlling partitions to maintain the pressure of the furnace gas in the *melting* step higher than that in the cooling step. Basis for maintaining the pressure of the furnace gas in the melting step higher than that in the cooling step is found in the description at page 11, lines 8-12, 16-18 and 22-25; page 19, lines 6-10; page 20, lines 6-10; page 25, lines 1-3; page 26, lines 16-18. It is also inherent in the description of the flow of furnace gas from the melting zone to the cooling zone. The corresponding obvious error on page 4 of the specification has similarly been corrected.

New dependent Claim 15 recites that the pressure of the furnace gas in the cooling step is maintained higher than that of the gas in the feeding step. Basis for maintaining the pressure of the furnace gas in the cooling step higher than that of the gas in the feeding step is found at page 25, lines 22-23.

The claimed invention is directed to a method for producing reduced iron in a rotary hearth furnace. A conventional rotary hearth furnace is disclosed in U.S. patent 6,413,471 (Kamikawa et al). According to Kamikawa et al, the production of reduced iron in a rotary hearth furnace presents the problem that the reduced iron tends to be reoxidized by air

entering the furnace via the material supply port and flowing back to the discharge portion of the furnace, due to the negative pressure therein (column 2, lines 7-45).

The solution proposed in Kamikawa et al is to provide partitions which isolate the material ("compact") supply portion of the furnace, and thereby prevent the outside air which enters the furnace at the compact supply portion from reaching the high temperature atmosphere space portion or the material ("compact") discharge portion (column 3, lines 4-12). More particularly, as shown in Figure 1, the raw material is introduced in a compact supply portion 44 and transported in a hearth rotation direction T (column 7, lines 35-38). On the other hand, the gas in the high temperature space S flows in a counter direction G (column 7, lines 41-42) toward the off gas duct 40. The reduced material is discharged at the compact discharge portion 45.

Partitions 53a and 53b respectively isolate the compact supply portion 44 from the high temperature portion S and the discharge portion 45, and partition 53c isolates that discharge portion 45 from the high temperature space S (column 7, line 63 through column 8, line 8). "Thus, this air can be prevented from contacting direct-reduced iron to be discharged from the compact discharge portion 45, and thereby reoxidizing the direct-reduced iron" (column 8, lines 8-11).

It may therefore be appreciated that Kamikawa et al teaches that reoxidization of the reduced iron can be minimized by blocking or suppressing gas flow to the discharge portion 45, from either the supply portion 44 or the high temperature portion S.

The present invention is also concerned with the reoxidation of raw material which has been reduced in a rotary hearth furnace. However, instead of providing partitions which suppress the gas flow to the discharge portion in all directions, the invention is based on the idea of allowing the flow of furnace gas to the cooling portion, but only in the direction of movement of the hearth. Thus, according to the feature of Claim 1, the partitions are "flow

rate-controlling partitions" which control the flow of furnace gas to allow the furnace gas and the cooling step to flow in the direction of movement in the hearth but prevent oxidizing gas from flowing from the discharging step to the cooling step. For example, the partitions may include perforations 8 as shown in Figures 5(1) or 5(2), or may be vertically movable as shown in Figures 8(1) or 8(2). Since the furnace gas in the cooling step is allowed to flow in the direction of the movement of the hearth, the pressure therein is increased, and the tendency of oxidizing air from the feeding portion to enter therein is reduced.

According to the feature of the invention set forth in amended Claim 2, the pressure of the furnace gas in the *melting* step is maintained higher than that in the other steps. This, again, can be achieved via the selective placement of the flow rate controlling partitions. Therefore, the furnace gas from the melting zone will flow into the cooling zone to raise its pressure, and the tendency of oxidizing air to enter the cooling zone from the feeding zone will be reduced.

Claims 1-4 were rejected under 35 U.S.C. § 102 as being anticipated by Kamikawa et al. According to the Office Action, heating, reducing and melting of the raw material are performed in the high temperature atmosphere S, and cooling and discharging are performed in the discharge portion 45, of Kamikawa et al. The Office Action further notes that Kamikawa et al "teaches air flow controlling partitions" which are considered to "read on the flow rate controlling partitions as recited in the instant claims." It is nonetheless respectfully submitted that the amended claims clearly define over Kamikawa et al.

Claim 1 is a method claim which recites that the furnace gas in the cooling step is allowed to flow in the direction of the movement of the hearth, and oxidizing gas is prevented from flowing from the discharging step to the cooling step, using the flow rate-controlling partitions. Contrary to the Office Action, this step is not taught for the partition plates 53a-53c of Kawikawa et al. While it may be said that these partition plates affect the flow of gas

in the furnace, this is true only to the extent that they *block or suppress* the flow of air; they do not allow furnace gas in the cooling step to flow in the direction of the movement of the hearth or any other direction. For example, "air F_1, which has flowed forward in the direction of rotation of the hearth 34 after the entry of the air F into the furnace through the compact supply portion 44, is *blocked* by the central partition plate 53a" and the central partition plate 53c, so that "air can be prevented from contacting direct-reduced iron to be discharged from the compact discharge portion 45" (column 8, lines 1-10; emphasis added). In other words, the furnace gas in the "cooling step" 45 of Kamikawa et al is blocked or isolated, and *not* "allowed to flow in the direction of movement of the hearth, by the flow rate controlling partitions" in Kamikawa et al. Claim 1 therefore defines over this reference.

Concerning Claim 2, it is noted that there is no dispute that Kamikawa et al teaches maintaining the high temperature space S, which the Office Action considers to include the "melting step," at a negative pressure (col. 7, lines 60-61). Accordingly, the cooling step cannot have a higher pressure, and Claim 2 and its dependent claims also define over this reference.

In particular, new Claim 15 recites that the pressure of the furnace gas in the cooling step is maintained higher than that of the gas in the feeding step using the flow rate-controlling partitions.

Concerning the rejections of the dependent Claims 5-10 as being obvious over Kamikawa et al, and Claims 8-10 as being obvious over Kamikawa et al in view of U.S. patent 6,478,839 (Kansa et al), since these rejections were directed to the features of the dependent claims, it is respectfully submitted that they do not negate the failure of the prior art to teach the features of Claims 1 and 2 from which these claims depend. All of the claims are therefore believed to define over the cited prior art.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Robert T. Pous
Attorney of Record
Registration No. 29,099

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

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